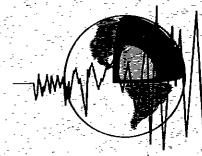


DRAFT

SEISMIC REFLECTION SURVEY  
SIMPLEX PIER DREDGING PROJECT  
PISCATAQUA RIVER  
NEWINGTON, NEW HAMPSHIRE

Prepared for  
BRIGGS ENGINEERING & TESTING COMPANY

June 1982



**Weston Geophysical**  
CORPORATION



# Weston Geophysical

CORPORATION

June 2, 1982  
WGC-420-1

Briggs Engineering & Testing Company  
164 Washington Street  
Norwell, Massachusetts 02061

Gentlemen:

In accordance with your letter of authorization dated May 11, 1982, Weston Geophysical Corporation has conducted a seismic reflection survey on the Piscataqua River in the vicinity of the Simplex pier in Newington, New Hampshire.

We are pleased to submit the results of that survey in this draft report.

Very truly yours,

WESTON GEOPHYSICAL CORPORATION

Bruce Marshall  
for Vincent J. Murphy

BM:VJM:sn

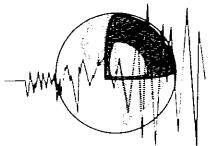
Enclosure

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## 1.0 INTRODUCTION AND PURPOSE

DRAFT

A seismic reflection survey was conducted for Briggs Engineering & Testing Company under U.S. Army Corps of Engineers contract, on the Piscataqua River in the vicinity of the Simplex Wire and Cable Company pier in Newington, New Hampshire during the period of May 19, to May 21, 1982.

The purpose of this survey was to determine the depth to rock in the site area prior to dredging operations. The rock surface profiles shown on the reflection data are to be used to determine the number and locations of borings to be made at the site as well as provide information on thicknesses and layering of materials overlying rock.

The area of investigation and survey lines were established by the U.S. Army Corps of Engineers and shown as Attachments 2 and 3 in the GEB Requisition No. 82-24. Field operations conducted by Weston Geophysical were coordinated with Mr. David S. Campbell of Briggs Engineering.

The survey consisted of ten lines each approximately 900 feet in length. Two additional lines, each approximately 400 feet in length, were run southwest of the caissons that exist downstream of the Simplex pier.

## 2.0 LOCATION AND SURVEY CONTROL

The survey area is shown on the area of investigation map, Figure 1. This map is a section of the Portsmouth, New Hampshire-Maine 7 1/2 minute quadrangle sheet.

Horizontal location control and river elevation data for this survey were provided by Briggs Engineering. The plan map of seismic reflection lines, Figure 2, was provided to Weston Geophysical by Briggs Engineering.

### 3.0 METHOD OF INVESTIGATION

The seismic investigation consisted of continuous reflection profiling; the energy source used was an electro-mechanical transducer (or "Boomer") with a peak frequency of approximately 500 hertz and an output energy of approximately 200 joules. The "Boomer" source results in high quality, high resolution data. From this data the various overburden layers and the basement reflection can be defined. Refer to Appendix A for additional information on the marine reflection technique and associated geophysical equipment.

### 4.0 PRESNTATION OF RESULTS

The results of the survey are presented as profiles, (Figures 3 through 8). These figures are reproductions of the reflection records obtained in the field. Records have been enhanced to show major reflecting interfaces detected down to the basement material. It should be noted that the depth scale shown on these profiles is based on a seismic velocity value of 5,000 ft/sec, which generally corresponds to saturated overburden materials.

## 5.0 DISCUSSION OF RESULTS

The records obtained by the seismic reflection profiling system are a representation of the bottom and subbottom related to the travel time of the transmitted and reflected signals. The various reflecting interfaces detected are time related. Time relationship can be converted to depth if seismic velocity values are determined for the various layers detected. Seismic velocity measurements were not made during the course of the survey. A velocity value of 5,000 ft/sec, for the water column and overburden materials was used, in this study, to determine the depth to the "acoustic basement". This velocity value is the minimum value that would be expected for the overburden materials detected. If any material in the overburden sequence has an actual seismic velocity greater than 5,000 ft/sec the depths will be greater.

From reflection recordings identification of "acoustic basement" as rock can be conclusive only where seismic refraction measurements are made, or where borings are drilled to rock for correlation. Identification of "acoustic basement" based on the character of reflection returns is therefore tentative and subjective. Reasonably smooth horizons are interpreted as overburden type surfaces; irregular horizons, especially when covered by little or no overburden, are interpreted as rock.

The line shown on the reflection profiles (Figures 3 through 8), designated as the "acoustic basement", is interpreted as the rock interface.

#### 5.1 Field Conditions

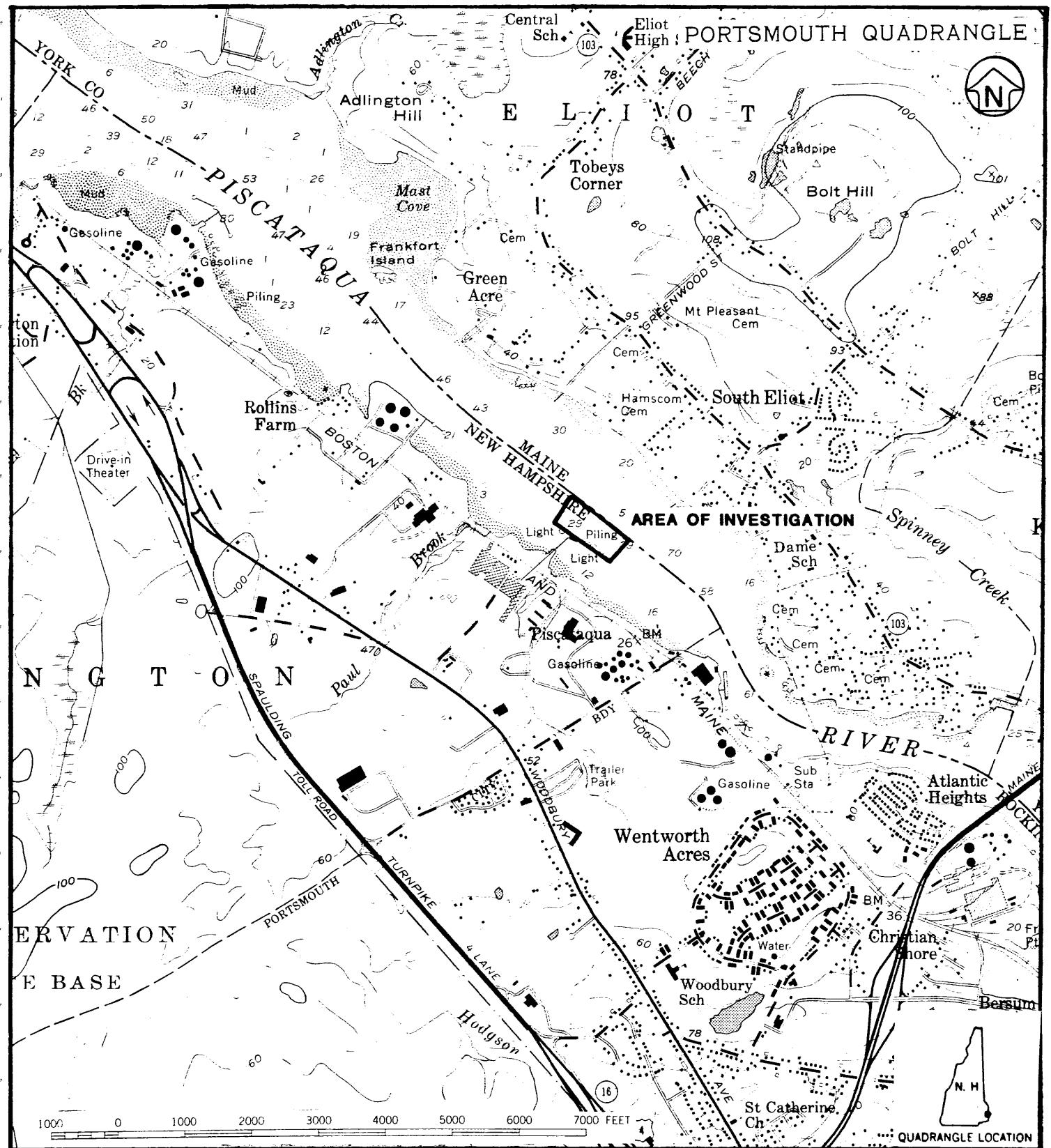
Coverage on lines 1 and 2, as shown on the Army Corps document GEB Requisition No. 82-24, Attachment 3, was not possible because of a ship docked at the pier and the presence of caissons downstream of the pier.

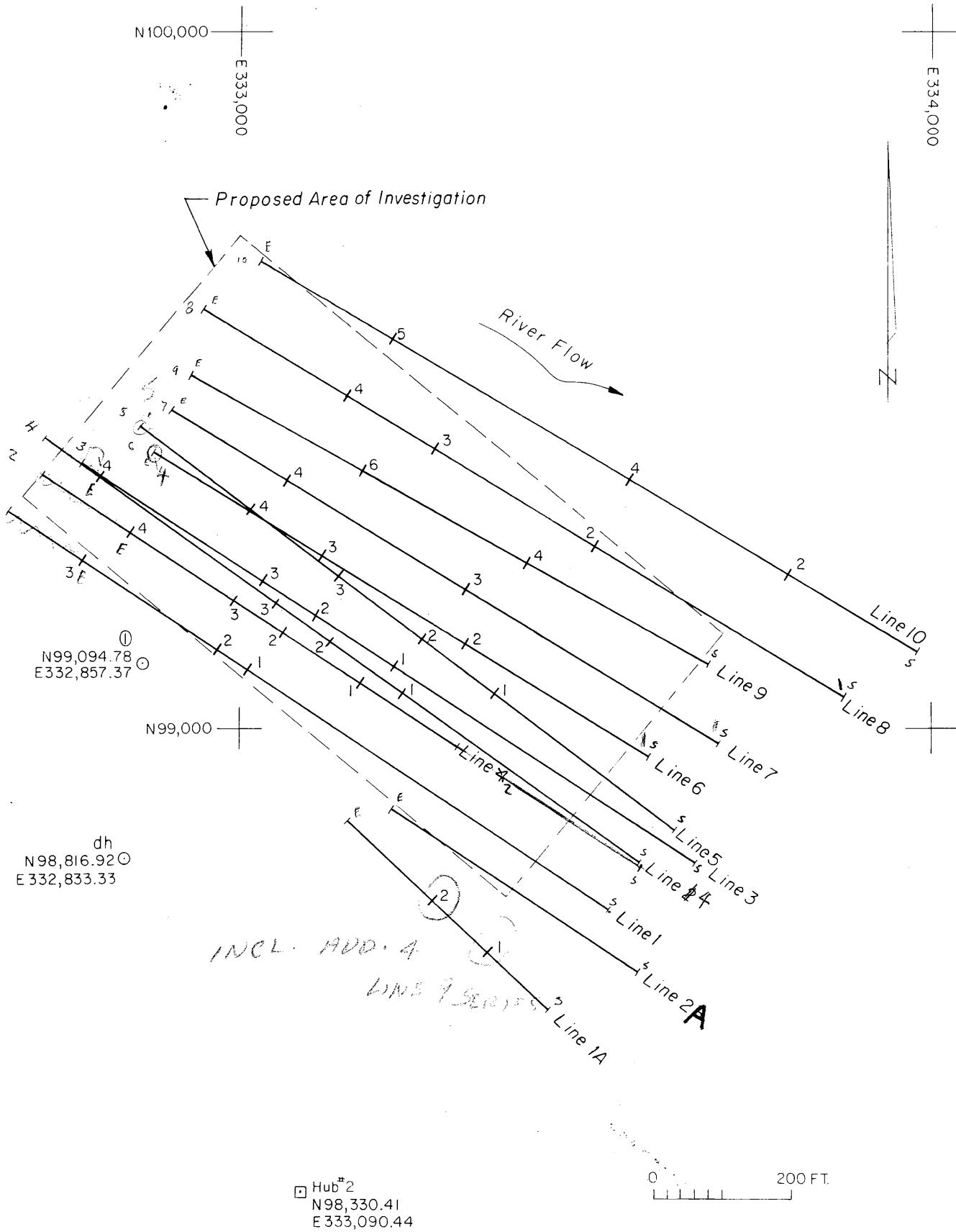
#### 6.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this survey indicate that the rock surface is generally in the depth range of 45 to 75 feet below mean low water (MLW) over most of the survey area. The data shows that the rock depths generally decrease toward the downstream boundary of the area. The approximate depth to rock is less than 45 feet on lines 1A, 2A and the downstream end of line 1. Rock depths less than 45 feet below MLW are also detected on the downstream end of lines 2, 3 and 4.

The shallowest depths to rock were detected in the southeasterly positions of this survey coverage. Borings are recommended for verification of depths to rock in the area of this investigation. A particular location for such correlation is the position of shallowest rock, as noted in the above paragraphs.

## FIGURES





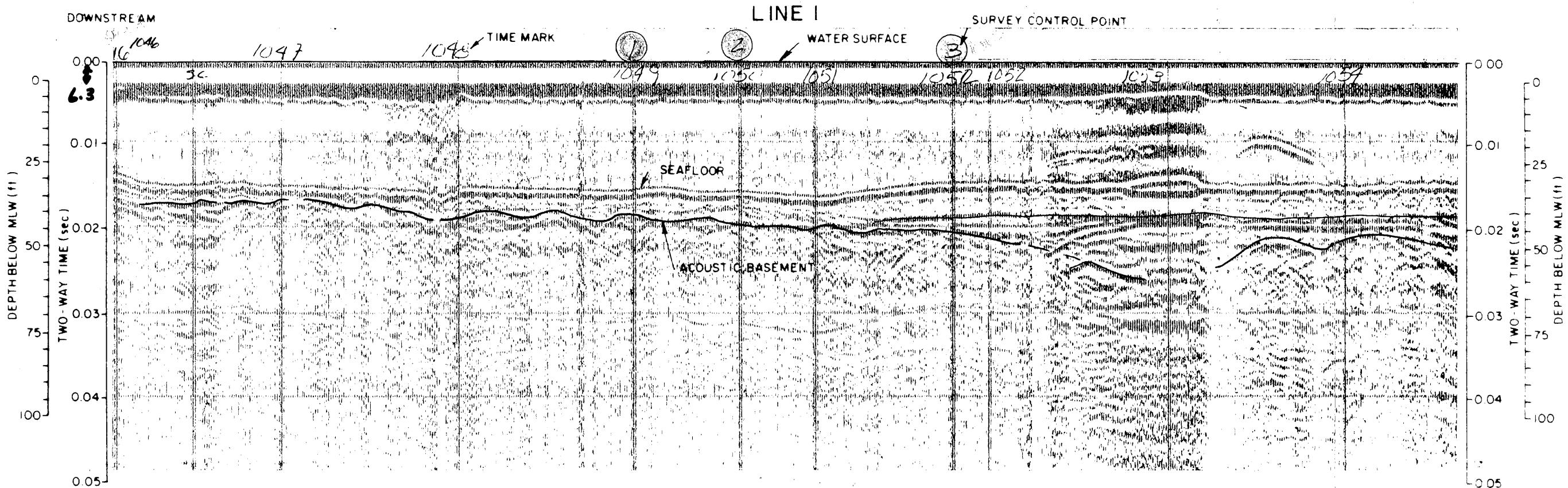
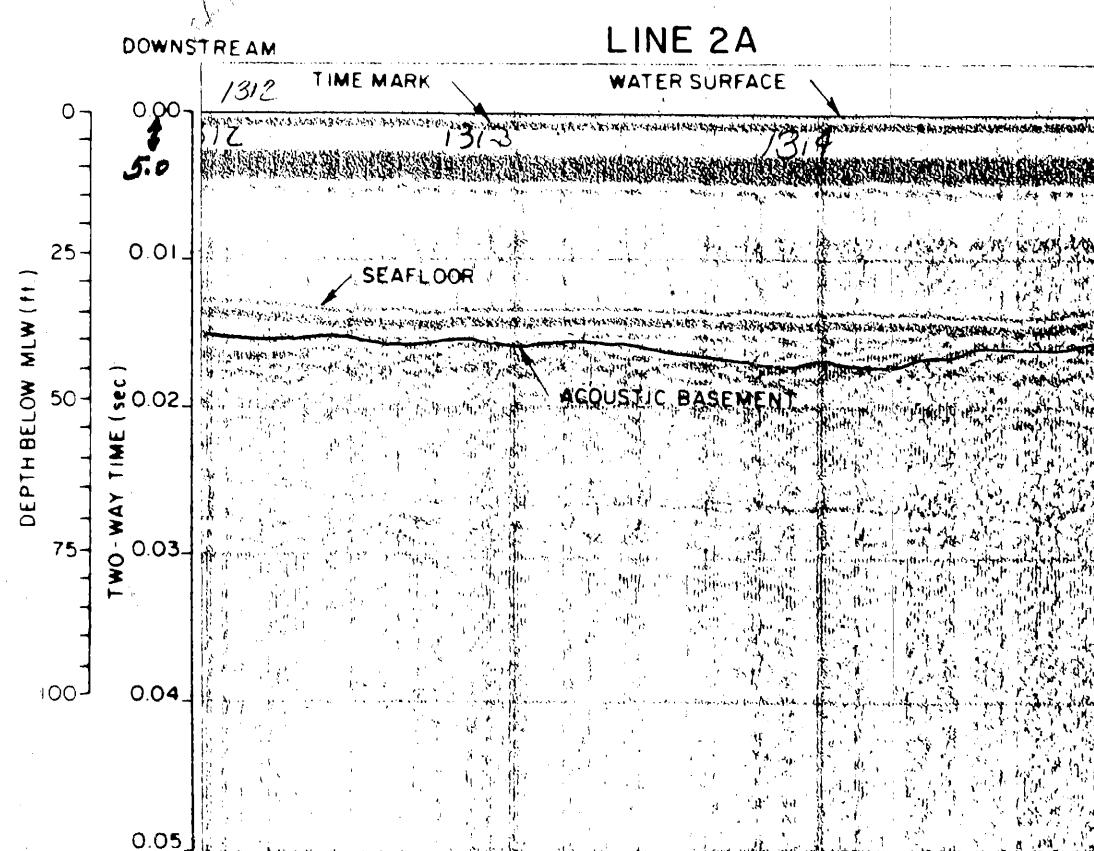
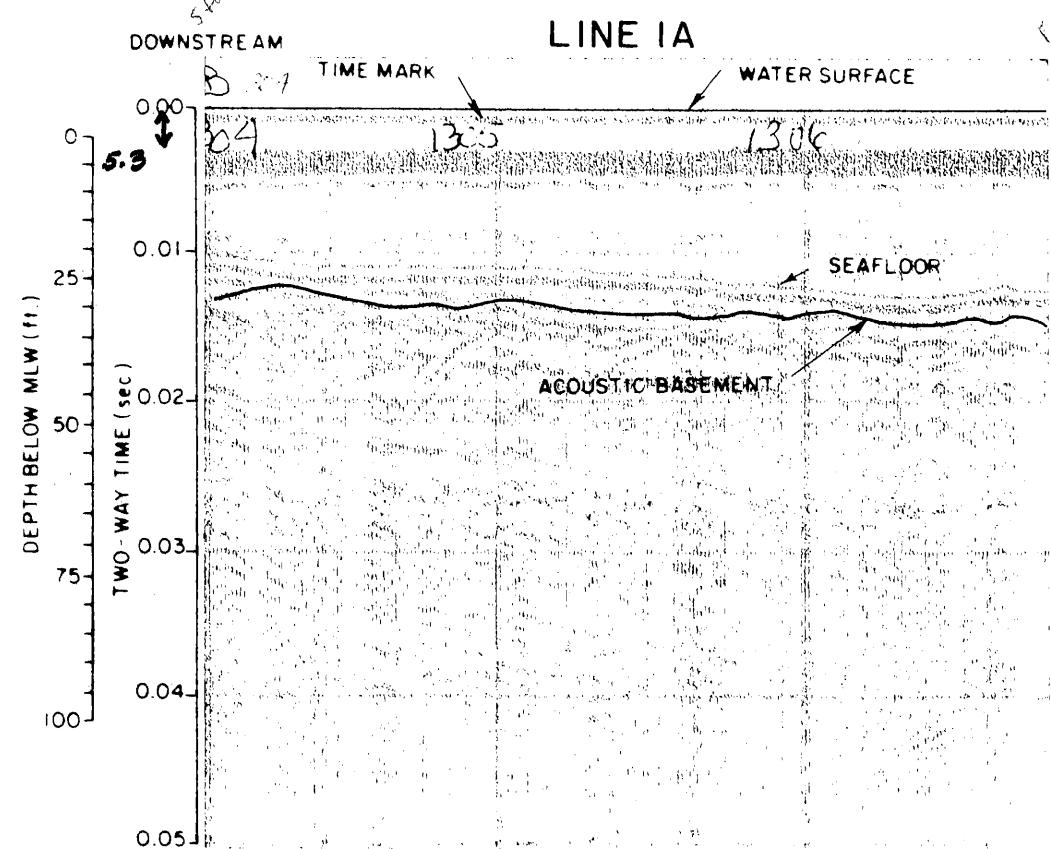
SEISMIC REFLECTION SURVEY  
SIMPLEX PIER DREDGING PROJECT  
PISCATAQUA RIVER  
NEWINGTON, N. H.  
for  
BRIGGS ENGINEERING & TESTING CO.

PLAN MAP

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FIGURE 2



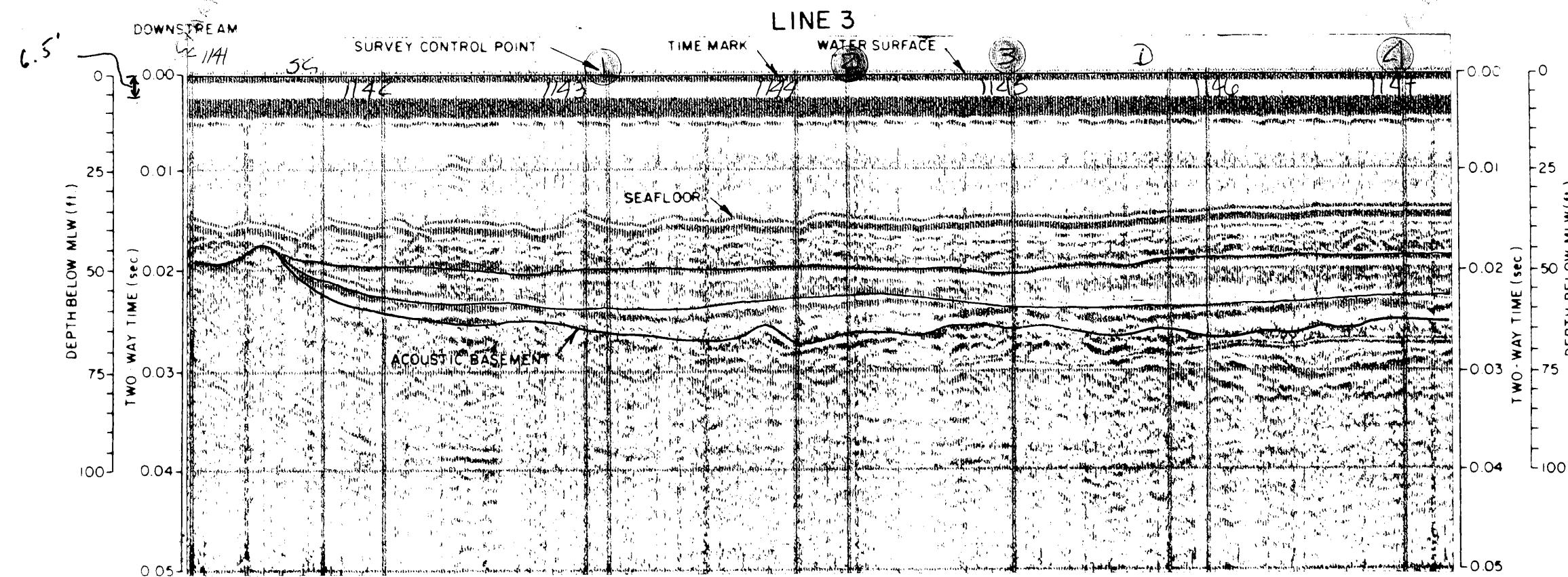
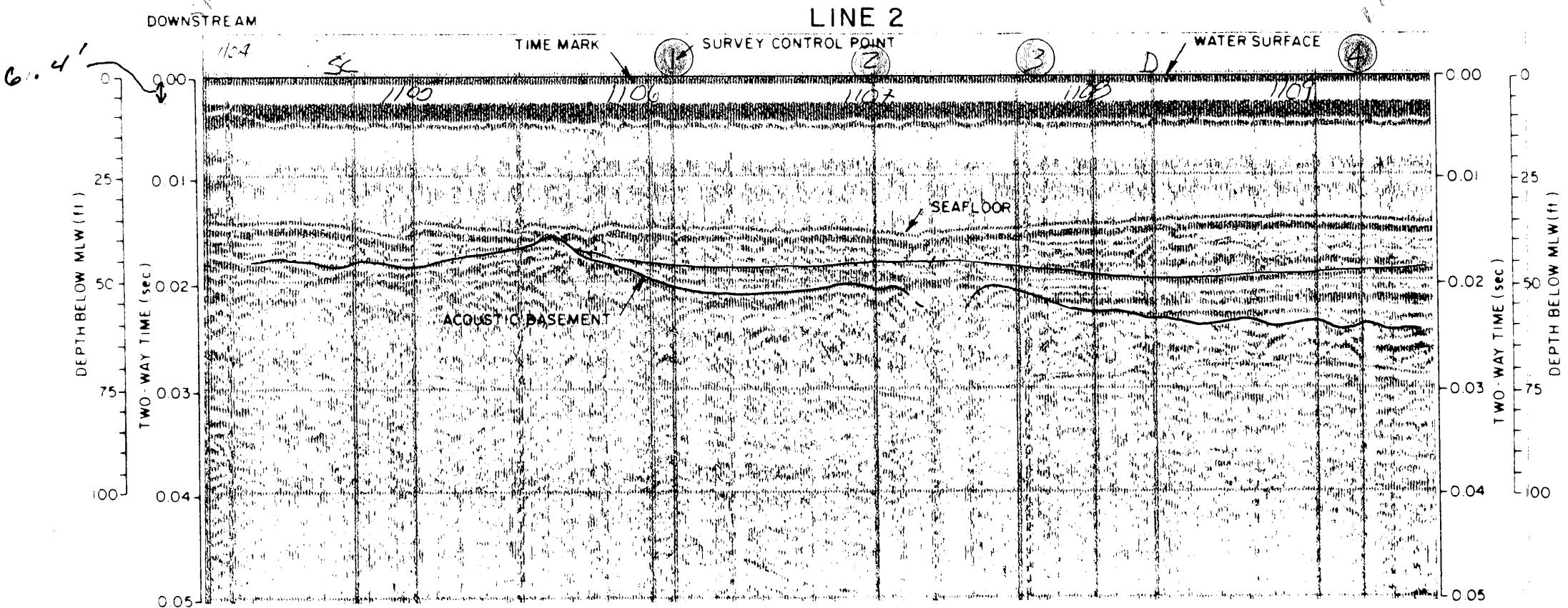
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SIMPLEX PIER DREDGING PROJECT  
PISCATAQUA RIVER  
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SEISMIC REFLECTION PROFILES—  
LINES 1A, 2A, and 1

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FIGURE 3



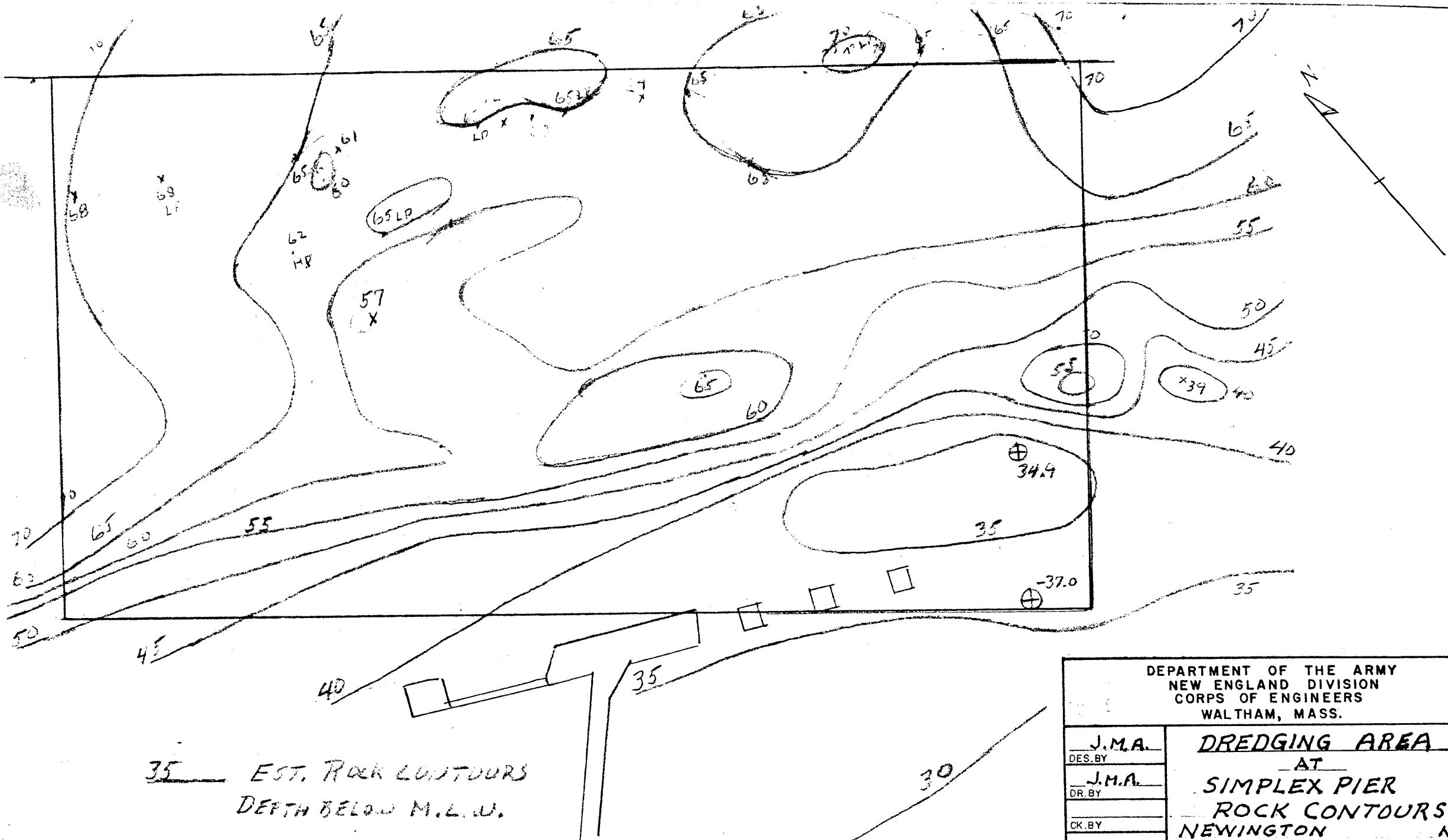
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SEISMIC REFLECTION PROFILES-  
LINES 2 and 3

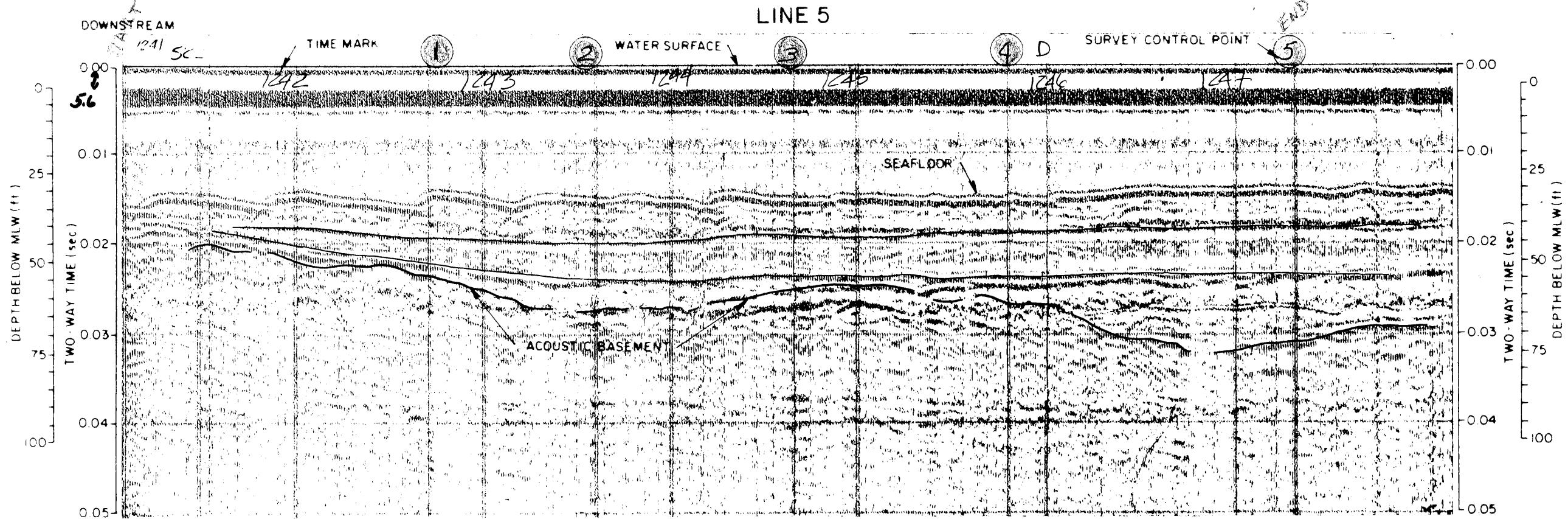
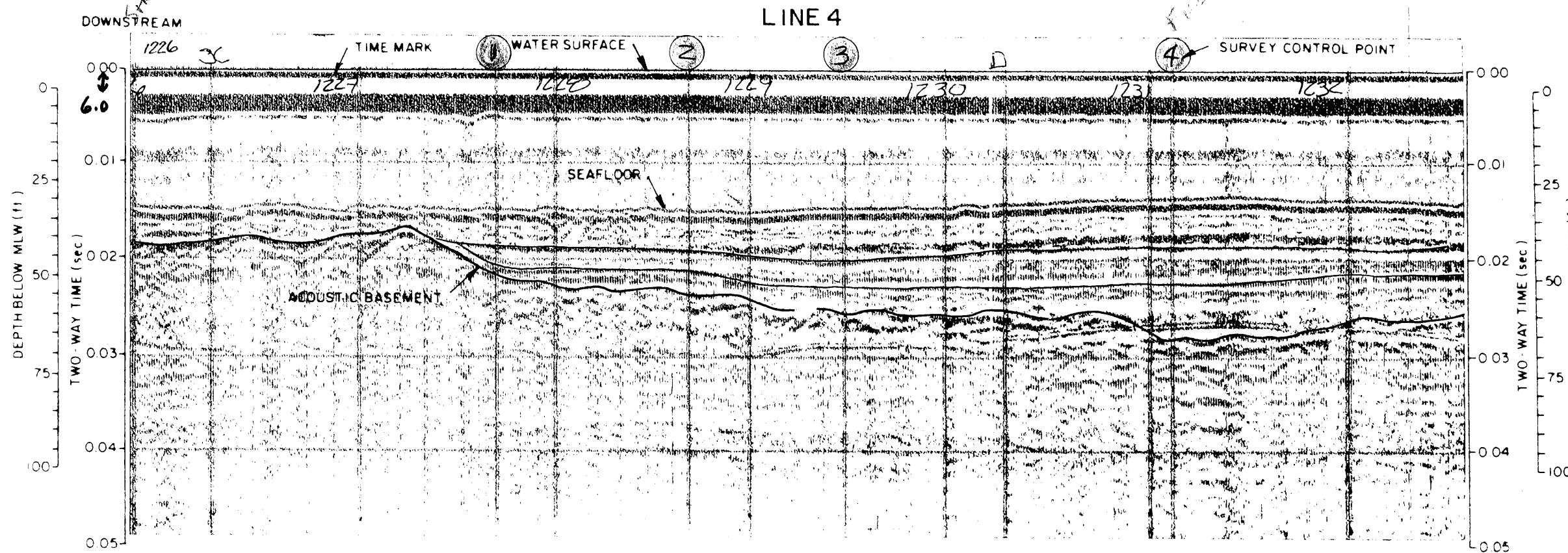
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FIGURE 4



DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS WALTHAM, MASS.		
J.M.A. DES.BY	<u>DREDGING AREA</u>	
J.M.A. DR.BY	AT	
CK.BY	SIMPLEX PIER	
ROCK CONTOURS		
NEWINGTON N.H.		
GEOTECH. ENG. BR. SCALE: 1"=100'		
SK. NO. S.P. 82-01 DATE: JULY '82		

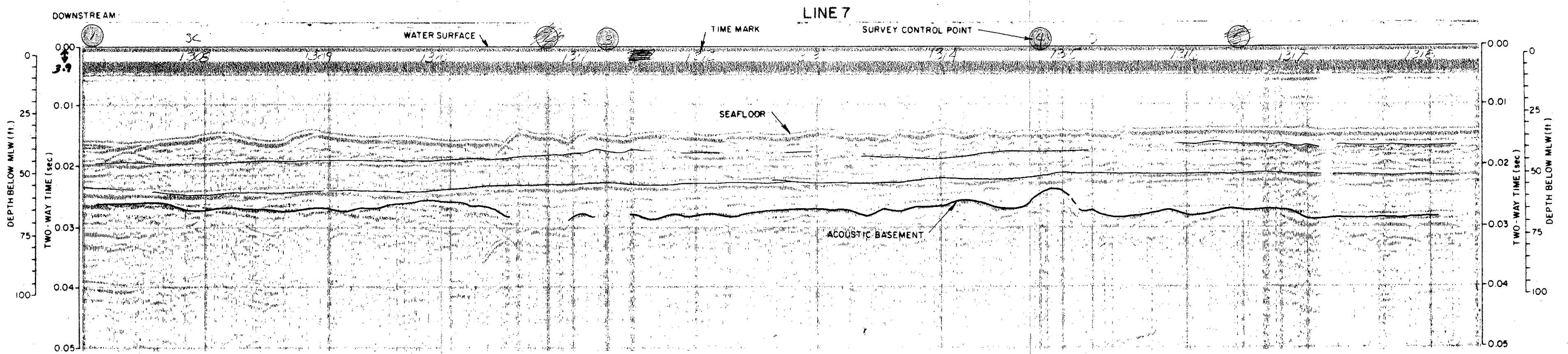
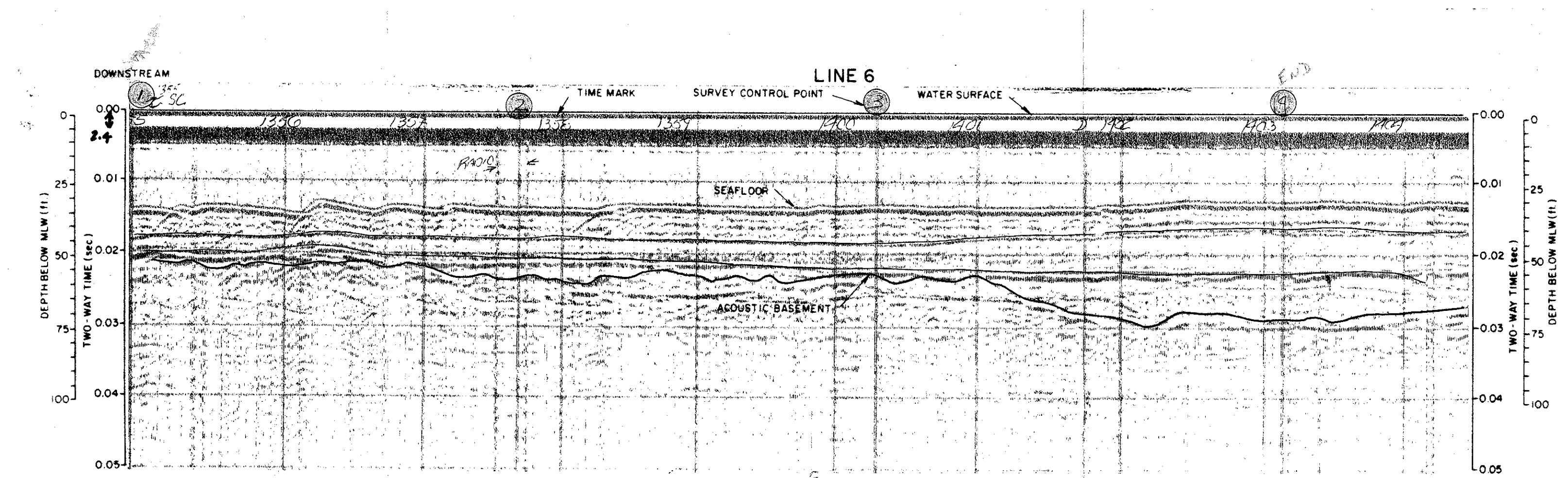


SEISMIC REFLECTION SURVEY  
SIMPLEX PIER DREDGING PROJECT  
PISCATAQUA RIVER  
NEWINGTON, N. H.  
for  
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SEISMIC REFLECTION PROFILES  
LINES 4 and 5

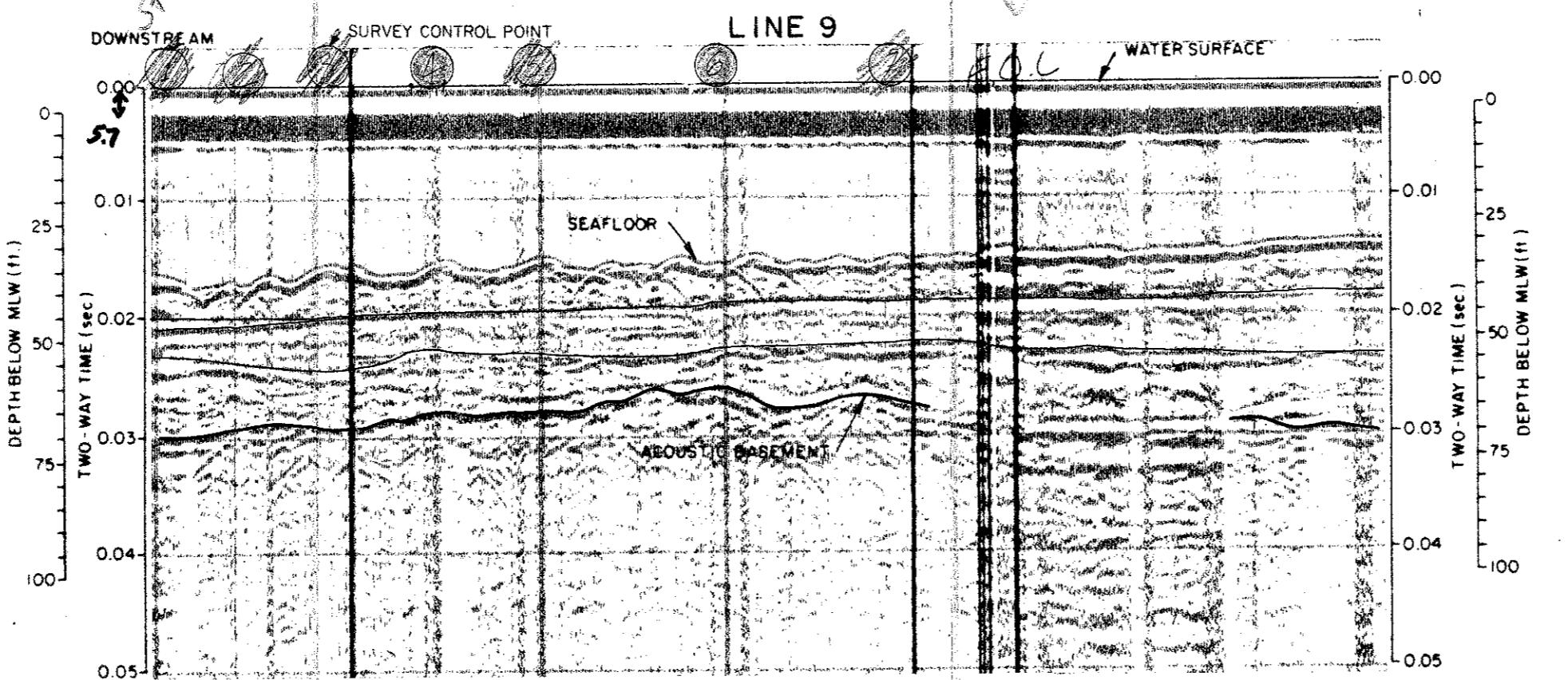
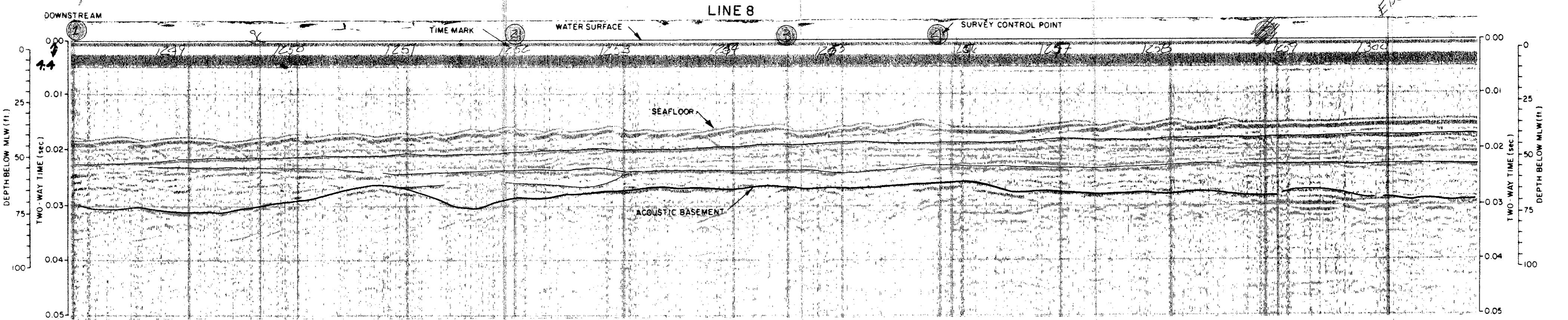
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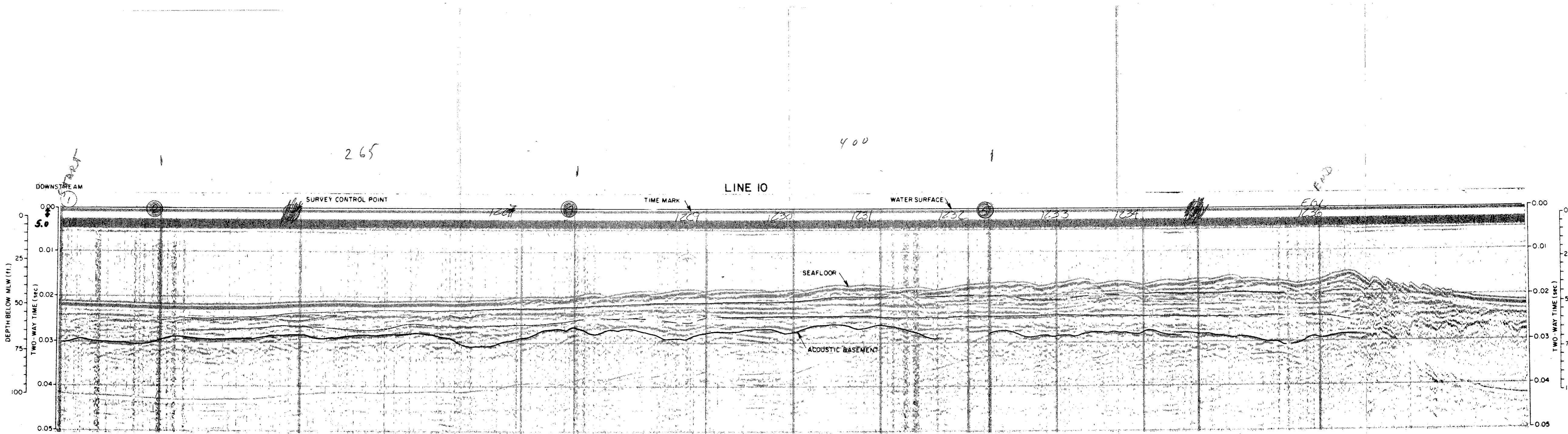
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SIMPLEX PIER DREDGING PROJECT  
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NEWINGTON, N. H.  
for  
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SEISMIC REFLECTION PROFILES-  
LINES 6 and 7  
WESTON GEOPHYSICAL CORP.  
JUNE, 1982



SEISMIC REFLECTION SURVEY  
SIMPLEX PIER DREDGING PROJECT  
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SEISMIC REFLECTION PROFILES-  
LINES 8 and 9  
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SEISMIC REFLECTION SURVEY  
SIMPLEX PIER DREDGING PROJECT  
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SEISMIC REFLECTION PROFILES-  
LINE 10  
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**APPENDIX A**  
**MARINE INVESTIGATION**

## APPENDIX A

### MARINE INVESTIGATION

#### Continuous Seismic Reflection Survey

##### (Including Fathometer Survey)

The continuous seismic reflection method (Figure A-1) utilizes an energy source and receiver array. For the present work, we used a continuous seismic profiling system used by Weston on numerous marine engineering projects. This proven system is comprised of an EPC Model 4100 graphic recorder, an EPC "Boomer," and an 20 element streamer. Part of the energy transmitted from the source is reflected from various horizons (bottom and subbottom); the returning reflection arrivals are displayed as a continuous graph with distance in one direction and time in the other. For the continuous recording fathometer, the record is similar except that no penetration is achieved through the bottom, and the reflection is that of the water-bottom interface only.

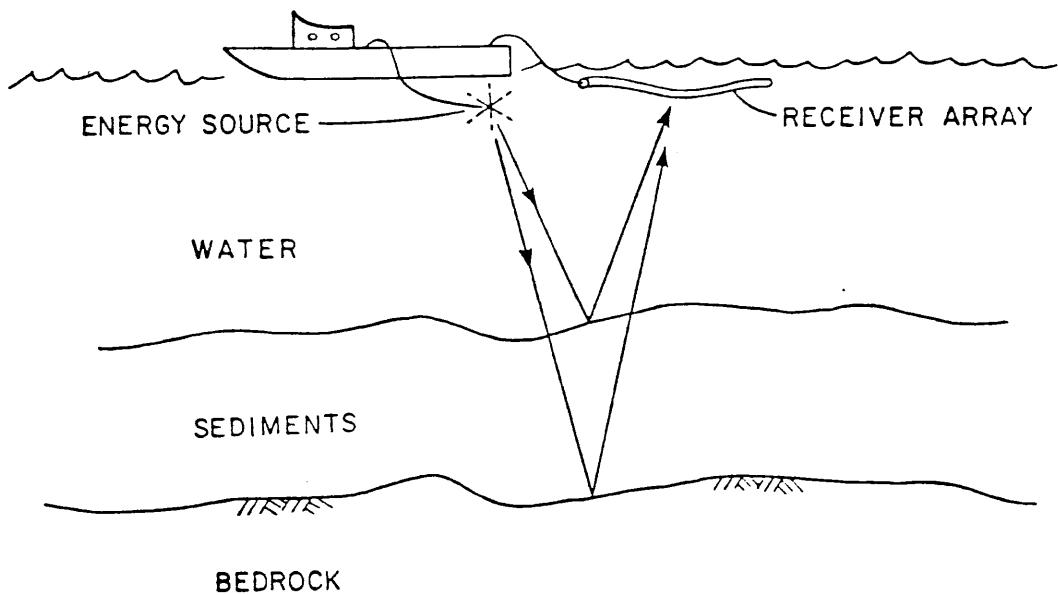
These devices are very useful tools for profiling continuously over a wide area. They effect a great deal of coverage in a short period of time and allow one to determine detail on bottom and subbottom horizons that would otherwise be impossible.

The energy in the reflected pulse is a function of both the seismic velocity contrast across the interface, which is acting as a reflector, and the density contrasts of the reflecting

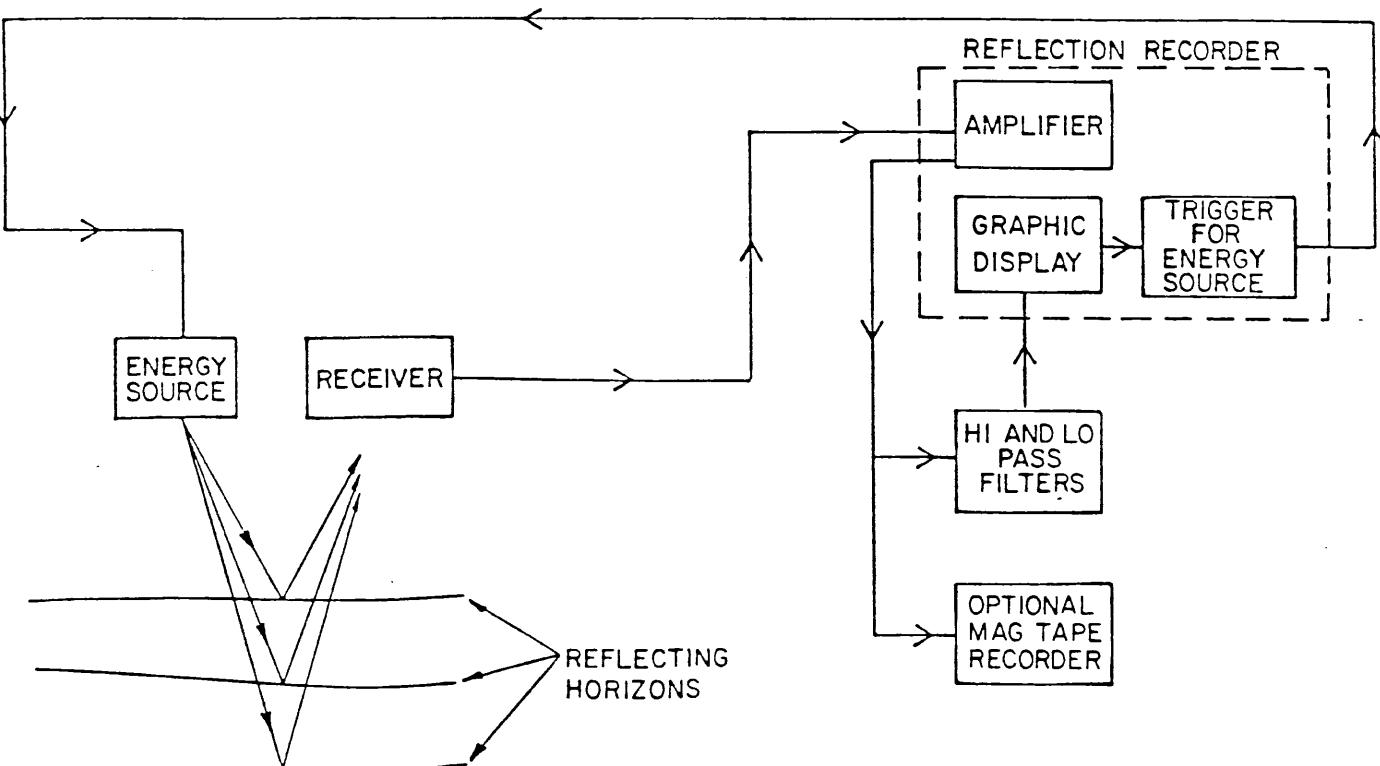
layers. These two parameters determine the acoustic impedance at the interface between two layers. Thus, layers with the same compressional velocity, for example, the water layer overlying a layer of saturated sandy material or a layer of saturated silty or clayey material, will show up on the continuous reflecting device even though the velocity of the seismic wave through these three materials is identical at 5,000 ft/sec. The reflection takes place because the density contrast between the materials is sufficient to produce a reflected wave at each one of the interfaces.

The continuous recording fathometer measurements complement the seismic program by simultaneously determining water depths, which are directly converted to water-bottom elevations.

Because the reflection method itself simply measures the time for the outgoing pulse to go through the various strata and return to the detector, it does not measure the velocities of the materials through which the signal travels.



a. GEOMETRY OF SEISMIC WAVE RAY PATH



b. INSTRUMENTATION

SEISMIC REFLECTION METHOD  
FIGURE A-1